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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,881	09/23/2003	Robin E. Gorrell	58053US005	3599

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EXAMINER

CHU, CHRIS C

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,881

Applicant(s)

GORRELL ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>5/3/04 & 2/17/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on February 17, 2004 and May 3, 2004 were filed before the mailing of a first Office action on the merits and within three months of the date of entry of the national stage as set forth in 1.491 in an international application. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

2. Figures 1, 2a, 2b, 5a and 5b should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “355” in Fig. 3 and “455” in Fig. 4 have been used to designate both solder ball and chip (see page 8, line 7 and page 10, line 1).

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because:

- a) they do not include the following reference sign(s) mentioned in the description:
 - i) In Fig. 5a, reference numeral “530a, 510a, 560a and 520a” are not disclosed in the specification.

- ii) In Fig. 11a, reference numeral “1210a and 1200a” are not disclosed in the specification.
 - iii) In Fig. 11b, reference numeral “1210b and 1200b” are not disclosed in the specification.
 - iv) In Fig. 11c, reference numeral “1210c and 1200c” are not disclosed in the specification.
- b) they do not include the following reference sign(s) mentioned in the description:
- i) On page 10, line 24, the stiffener ring “530” is not referenced in the figures.
 - ii) On page 11, line 2, the gap “560”, the die “510” and the stiffener ring “530” are not referenced in the figures.
5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation “the substrate board attach surface comprises at least one solid plane covering the chip attach surface region near at least one chip corner” in claims 1 and 4 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

7. The disclosure is objected to because of the following informalities:
- (a) On page 13, lines 4, a high strain region “1210” should be --1210a – 1210c-- and the die corner “1200” should be --1200a – 1200c--.
 - (b) “soldermask” should be --solder mask--.
- Appropriate correction is required.

Claim Objections

8. Claims 2, 6 and 8 objected to because of the following informalities: “soldermask” should be --solder mask--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Davies et al. (U. S. Pat. No. 5,901,041).

Regarding claim 1, Davies et al. discloses in e.g., Fig. 2 and Fig. 3 a laminated flip-chip interconnect package (a package 10 in Fig. 1, Fig. 4 and column 3, lines 15 – 46) comprising

- a substrate (14; column 3, lines 16 – 19) having a chip (12; column 3, lines 34 – 35) attach surface (32) and a board (PCB 40; column 4, lines 30 – 31) attach surface (34) that define contact pads (pads under the flip-chip solder balls 80 in Fig. 4 and pads on the solder balls 16) for attachment to corresponding pads on the chip and board (see Fig. 3 and Fig. 4),
- wherein the substrate board attach surface (34) comprises at least one solid plane (24) covering the chip attach surface region near at least one chip corner,
- said solid plane comprising a dielectric material (epoxy 24; column 3, lines 60 – 61).

11. Claims 1 - 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Farquhar et al. (U. S. Pat. No. 6,600,224).

Regarding claim 1, Farquhar et al. discloses in e.g., Figs. 1a – 1c and column 4, lines 1 – 30 a laminated flip-chip interconnect package (16) comprising

- a substrate (16) having a chip (10 in Fig. 1c; column 5, lines 24 – 25) attach surface and a board (26; column 5, lines 39 – 40) attach surface that define contact pads (22

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- and the pads the top surface of the element 16 for the chip 10 in Fig. 1c) for attachment to corresponding pads on the chip and board (see Fig. 1c),
- wherein the substrate board attach surface (the surface that has the element 22) comprises at least one solid plane (18) covering the chip attach surface region near at least one chip corner (see Fig. 1c),
 - said solid plane comprising a dielectric material (the top dielectric adhesive layer in the adhesive coated polyimide spacer 18; column 3, lines 30 – 34).

Regarding claim 2, Farquhar et al. discloses in e.g., Figs. 1a – 1c and column 4, lines 1 – 30 said dielectric material (the top dielectric adhesive layer in the adhesive coated polyimide spacer 18) being covered with a layer of a coverlay material (the polyimide layer; column 4, lines 14 – 15).

Regarding claim 3, Farquhar et al. discloses in e.g., Figs. 1a – 1c and column 4, lines 14 – 15 said layer of material being polyimide.

12. Claims 4 – 6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Lau (U. S. Pat. No. 6,075,710).

Regarding claim 4, Lau discloses in e.g., Fig. 3, Fig. 4A and column 4, line 58 – column 5, line 15 a laminated flip-chip interconnect package (100; column 1, line 67 – column 2, line 2) comprising

- a substrate (110) having a chip attach surface (the surface that is connected a chip 105) and a board attach surface (the surface that is connected to the PCB 150) that

- define contact pads (the pads on the both surfaces) for attachment to corresponding pads on the chip and board,
- wherein the substrate board surface comprises at least one solid plane (130 at the left corner in Fig. 3) covering the chip attach surface region near the chip corners (see Fig. 3),
 - said solid plane comprising a metal (copper 130; column 5, lines 38 – 40).

Regarding claim 5, Lau discloses in e.g., Fig. 3 and Fig. 4A said metal being copper (copper 130; column 5, lines 38 – 40).

Regarding claim 6, Lau discloses in e.g., Fig. 3 and Fig. 4A said metal (130 at the left corner in Fig. 3) being covered with a layer of a soldermask (155; column 5, lines 65 – 66).

Regarding claim 8, Lau discloses in e.g., Fig. 3 and Fig. 4A said soldermask (155) having a plurality of openings defining ball grid array pads (130 except the 130 at the left corner in Fig. 3).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lau in view of Knapp et al. (U. S. Pat. No. 5,973,337).

While Lau teaches the use of the soldermask material, Lau does not appear to provide any example of the soldermask's specific composition. Knapp et al. teaches in e.g., Fig. 1 and column 2, lines 50 – 51 the soldermask material (23) may be composed of a polyimide. It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the polyimide as the specific material to form the soldermask material at the bottom surface of the interposer of Lau as taught by Knapp et al. (1) to reduce cost of manufacture by using a low cost polymer material (i.e., polyimide), (2) to provide an excellent heat resistance and radiation resistance polymer at cryogenic temperatures and (3) to provide a liquid soldermask material (column 2, lines 50 – 51).

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jimarez et al., Yeo et al., Nishihara et al., Derryberry et al., Juskey et al., Barrow, Watanabe et al., Andoh, Ichinose, Appelt et al. and Asai et al. disclose an interposer with pad/spacer at the bottom surface that covers a chip attach surface region near the chip corners.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
November 10, 2004


GEORGE ECKERT
PRIMARY EXAMINER